

CLAIMS

1. (Original) A reverse circulation down-the-hole hammer assembly having a chuck at a lower end thereof for holding a reverse circulation drill bit with an axial passage to convey drilling debris from the face of such drill bit, the hammer assembly incorporating a pneumatically operated piston of annular form and the assembly further including a central tube extending axially through said hammer and into the region of the chuck, where it can be received in such axial passage in such a reverse circulation bit received in said chuck, said central tube having a downwardly facing abutment and an upwardly facing abutment above the downwardly facing abutment, the central tube being located axially in the hammer assembly by having the part thereof between said upwardly and downwardly facing abutments located between axially spaced complementary abutments, one of the two complementary abutments between which the central tube is located being a fixed abutment provided by a first structure within the hammer assembly and the other of said two complementary abutments being provided by a member, further from the drill bit than said first structure and which member is longitudinally displaceable within a casing part providing an upper end of the hammer assembly and which casing part is removably retained in or on an adjoining part of the hammer assembly, said longitudinally displaceable member being resiliently biased towards the chuck end of the hammer assembly and thus clamping the part of the central tube providing said upwardly and downwardly facing abutments between the fixed abutment and the abutment provided by the longitudinally displaceable member.
2. (Original) A hammer assembly according to claim 1 wherein said longitudinally displaceable member providing said other of said two complementary abutments comprises a tubular member (42) providing a socket receiving the upper end of said central tube and having a downwardly facing annular shoulder around its interior which shoulder defines the inner end of the socket and forms said other of said two complementary abutments, said upwardly facing abutment of said central tube being formed by the upper end of said central tube and being engaged by said annular shoulder, said tubular member being adapted for connection with a central tube of a drill string part when such drill string is connected to the upper end of the hammer assembly, and with the bore of said tubular member above said socket being in communication with the interior of the central tube of any such drill string part connected to the upper end of the hammer assembly.

3. (Original) A hammer assembly according to claim 2 wherein the upper part of said tubular member (42) and/or a tubular element fitted thereto is adapted for longitudinal sealing sliding engagement with a complementary tubular part above, such as the central tube of any such drill string part connected to the upper end of the hammer assembly.
4. (Currently Amended) A hammer assembly according to ~~any of~~ claims 1 to 3 wherein said casing part providing the upper part of the hammer assembly has a lower end screwed into or onto a hammer assembly casing part immediately below it and has an upper end adapted to be screwed into or onto the lower end of a drill string part or section.
5. (Currently Amended) A down-the-hole hammer assembly comprising a tubular outer casing, a drill chuck having an upper part releasably secured within, for example screwed into, a lower end of said tubular outer casing, a drill bit having a drill shank received within said chuck and having ~~and an~~ an upper end projecting from the upper end of the chuck for engagement by a hammer, a retaining element such as a split ring (16) around said projecting upper end of the drill bit shank, said hammer being reciprocable within guide means in the hammer assembly, including a guide bush (18) the lower end of which normally engages said retaining element or split ring, and wherein a further retaining ring, for example an elastomeric O-ring, is located within an internal annular groove around the tubular casing and engages in a recess ~~defined~~ defined between a chamfer at the lower end of said guide bush and a chamfer at the upper end of said retaining element or split ring, whereby when the chuck, with the drill bit and retaining element or split ring is removed from said outer casing, said guide bush will be retained by said further retaining ring or O-ring.
6. (Original) A reverse circulation down-the-hole hammer assembly having a chuck at a lower end thereof for holding a reverse circulation drill bit with an axial passage to convey drilling debris from the face of such drill bit, the hammer assembly incorporating a pneumatically operated piston of annular form and the assembly further including a central tube extending axially through said hammer and into the region of the chuck, where it can be received in such axial passage in such a reverse circulation bit received in said chuck, and wherein, at a plurality of locations along the central tube, the central tube has externally cylindrical regions which fits closely in corresponding bore portions in surrounding structures in the hammer assembly, and wherein such externally cylindrical regions of the central tube

are of progressively increasing external diameter with distance from the drill bit end of the hammer.

7. (Original) A drill bit for a reverse circulation rock drill, the drill bit having a head with a working face and a shank of reduced diameter as compared with the working face, the drill bit having one or more intake holes in the working face leading to a passage extending up the drill bit shank, the drill bit head having, at a location spaced from the working operative face, a circumferential band or collar providing a cylindrical external surface coaxial with the drill bit, the diameter of said circumferential band or collar being substantially equal to the effective diameter of the working face of the drill bit and not less than the diameter of any other part of the drill bit, the drill bit having a circumferential groove around its exterior, below said circumferential band or collar and having passages for exhaust air discharging into said groove, whereby such air can pass around the front of the drill bit and across said face to exit through said intake holes.

8. (Original) A drill bit according to claim 7 wherein the drill bit, below said circumferential groove has an exterior surface in the form of a cylinder interrupted by grooves extending longitudinally to the working face of the drill bit, for the passage of exhaust air to said working face from said circumferential groove.

9. (Currently Amended) A drill bit according to claim 7 ~~or claim 8~~ wherein above said circumferential band or collar, the drill bit has a further circumferential groove, directly below a circumferential rib which is of reduced external diameter as compared with said circumferential band or collar and which is provided for engagement by a bit catcher sleeve.

10. (New) A drill bit according to claim 8 wherein above said circumferential band or collar, the drill bit has a further circumferential groove, directly below a circumferential rib which is of reduced external diameter as compared with said circumferential band or collar and which is provided for engagement by a bit catcher sleeve.

11. (New) A hammer assembly according to claim 2 wherein said casing part providing the upper part of the hammer assembly has a lower end screwed into or onto a hammer assembly casing part immediately below it and has an upper end adapted to be screwed into or onto the lower end of a drill string part or section.

12. (New) A hammer assembly according to claim 3 wherein said casing part providing the upper part of the hammer assembly has a lower end screwed into or onto a hammer assembly casing part immediately below it and has an upper end adapted to be screwed into or onto the lower end of a drill string part or section.

Respectfully submitted,



Arnold B. Silverman
Registration Number 22,614
Attorney for Applicant

Telephone: 412-566-6965